

(4) Councillor Gustav Müller's essay on chemical industry contains a wealth of information hitherto scattered in official publications and technical journals, and only to be gleaned with difficulty. There is little doubt that it will become an indispensable book of reference to the chemical merchant and manufacturer, as well as a guide to the works manager, on all economical and statistical questions concerning his industry. The early chapter on general economic development contains a brief history of the growth of chemical industry in different countries, with full statistics for all the different branches dealt with. Valuable information is collected with regard to patents and trade marks, and the existing "trusts" or "Kartels." A chapter covering eighty pages, on the legal control of the industry, includes a discussion of patent laws, factory acts, workmen's insurance and health regulations, and includes details of the tariff rates for Germany and of trading treaties with other countries. In the second part of the work, a chapter is devoted to each individual branch of chemical industry, and here complete statistics of imports and exports for several years past are collected for each substance considered. The whole work is excellently arranged, and cannot but prove of the very highest utility.

(5) Mr. Harold Baron's report is the outcome of a tour undertaken in 1905 as Gartside scholar in the University of Manchester. Under the tenure of these scholarships, each scholar has to select some industry or part of an industry for examination, and investigate this comparatively in the United Kingdom and abroad. The present report is an account of a visit to a large number of chemical and textile works in Belgium, northern France, and Germany, with comments on their character and organisation. The report makes interesting reading, and contains a good deal of information likely to prove instructive to those not well acquainted with Continental chemical works and their methods. The description given of the wonderful works of the Bayer Company at Elberfeld and Leverkusen deserves to be widely read. At Leverkusen the works are equipped with a water supply capable of producing thirteen and a quarter million gallons per day, the daily consumption of Cologne, a town with 400,000 inhabitants, being only thirteen million gallons daily. Some idea of the vastness of the colour works may be derived from the fact that the azo-colour department alone necessitates the use of 78,000 tons of ice per annum for cooling purposes. Mr. Baron's report is, on the whole, a just and accurate statement, but a few errors occur which need correction. For example, some of the statements with regard to the processes of manufacturing artificial silk need revision. Such errors were, perhaps, to be expected in a report prepared under the conditions of the present and dealing with a very wide field.

(6) Dr. Rogers's book and system we conceive to be based on entirely wrong principles. His scheme of training in industrial chemistry adopted at the Platt Institute, Brooklyn, consists in passing the students (the nature of whose chemical knowledge is rather uncertain) through a course of preparations and

exercises under works-conditions in miniature. No attention is paid, apparently, to fundamental principles and process control. In less than 140 pages an enormous number of cookery-book recipes are given for the preparation of inorganic and organic compounds, pigments and lakes, driers, varnishes, paints and stains, soap and allied products, leather, wood pulp, and paper. The preparations are carried out with small works-plant, of which several illustrations are given in the book. We doubt the value of such a course in the education of a works-chemist, and consider that it would probably be to the detriment of the interests of his subsequent employers as tending to develop a blind and thoughtless empiricism. One of the most important factors in the success of a chemical works is a proper system of control, on scientific principles, of all stages of manufacture. We consider that it would be far better to work out a few—very few—manufacturing processes in detail, carefully studying by a proper system of tests the effects of varying the conditions, than to acquire a smattering of a large number of indiscriminately chosen works-operations. It is only by means of careful scientific control that chemical works in this country can hope to compete with foreign competition. To teach industrial chemistry as a series of cookery operations, involving the use of certain stock utensils, is likely to prove fatal in all cases, except in countries such as the United States, where high tariffs make economy of production a secondary consideration.

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HANDBOOKS ON ANIMAL STUDY.

- (1) *Zoologia*. By Angel Gallardo. Pp. 474. (Buenos Aires: Angel Estrada Cia., 1909.) Price 6 dollars.
- (2) *Einführung in die Biologie*. By Prof. Kar Kraepelin. Pp. viii+322. (Leipzig and Berlin: B. G. Teubner, 1909.) Price 4 marks.
- (3) *The Freshwater Aquarium and its Inhabitants*. By Otto Eggeling and Frederick Ehrenberg. Pp. vii+352. (New York: Henry Holt and Co.; London: G. Bell and Sons.) Price 8s. net.
- (4) *Bilder aus dem Ameisenleben*. By H. Viehmeyer. Pp. viii+159. (Leipzig: Quelle und Meyer, n.d.) Price 1.80 marks.
- (5) *Die Schwarzer der Menschen und Tiere*. By Dr. O. von Linstow. Pp. viii+144. (Leipzig: Quelle und Meyer, n.d.) Price 1.80 marks.
- (1) IT seems almost axiomatic that if a text-book of zoology begins by dealing with the obscure details and overwhelming nomenclature of cytology, it is a bad book. Bad because organisms are not aggregates of cells, and because such a method is essentially an inverted one in relation to the grasp of the beginner. In this text-book, written for the School of Pharmacy at Buenos Aires, the inversion appears complete. The end of the book is an introduction showing how zoology has been pursued in the republic, whilst the beginning is occupied by Karyokinesis, modes of segmentation, and other difficult subjects. After general histology, we have evolution and transformation-theories treated in that diagrammatic and

dogmatic way that is so destructive of their interest and advancement. The classification of animals adopted, Unicellularia, Radiata, Bilateria, is almost as antique as that of the animal and vegetative functions maintained in the earlier part of this book. The "worms" are reduced to a type characterised by a trophosphere-larva and nephridia, whilst, for the benefit of medical students, only parasitic forms are described. The book is, in fact, a compilation of the "cram" order, and is devoted mainly to the structure and life-history of parasites. In no single instance is the scale of a figure given.

(2) In spite of the very large output of books on biology, there is still no modern work in which the factors of the life of plants are correlated with those of animal life in a broad and intimate manner. This text-book is, perhaps, as near an approach to such a treatment as the limits of a cheap school-book allow, and in the second edition just issued the breadth of treatment has been increased. The contents are divided into three parts. First come the relations of organisms to environment; then follows an account of structure and functions; lastly, a brief chapter on psychology and anthropology. Between the last two parts is a short, clear account of evidence for the theory of descent. Of these three sections, the first is undoubtedly the most novel for a work of this kind. It is very doubtful whether the author has not attempted to compress far too much information into these pages, and certainly the attempt to teach the subject from such a book as this without simplifying its contents would be disastrous. The work itself appears to be a well-illustrated summary of facts, but it is as hard to assimilate as a concentrated foodstuff. The teacher must supply the zymogen.

(3) In this American book the experience of the professional "aquarist" and importer has been combined with that of the practised amateur. The result is a volume full of interesting matter and of practical suggestion to naturalists and teachers. The introduction of many beautifully coloured fish from Texas, Florida, India, and other countries into the northern States enables a very great choice of interesting subjects to be drawn upon. The climbing perch, the "shooter" that brings its prey down by spitting, and the lovely Paradise fish Macropodus, the nests of which are readily constructed in captivity, are some of the more striking oriental fish introduced by one of the authors. The Reptilia and Amphibia are also fully considered, and the book concludes with most useful advice on the choice of natural and artificial foods. In these days of experimental stations and school laboratories, such a practical guide as this should be very welcome. The illustrations are excellent, and the only fault we have to find with the work is its weight, which not only splits the binding, but tires the hand.

(4) The value of this little book lies in the fact that its descriptions of the occurrence and habits of ants are largely written down from the author's observation. The sketches are thrown into a conversational form so as to appeal to children. The various beetles found in ants' nests are fully considered and figured, and the author is evidently acquainted with the literature of the subject. We can heartily recommend this

little book as a record of long and patient observation, and as a very useful *résumé* of the most distinctive and interesting features in the life of these highly organised animals.

(5) Dr. von Linstow's popular account of human and animal parasites ends badly from the beginning. On the cover of the book there is a gruesome picture of infected pond-life, and a tragedy occurs on almost every page. The contents describe some appalling cases of the course of parasitical diseases, and whilst we fully acknowledge the abundant knowledge and clear exposition that has gone to its making, we can hardly believe that such a treatise is appropriate to a series suitable for children and people generally. Pan certainly has a terrifying aspect when seen thus, and it would have relieved the depression if the available prophylactic and remedial measures could, as far as possible, have been described.

ELEMENTARY PHYSICS.

- (1) *An Introduction to Physical Science.* By Dr. F. H. Getman. Pp. ix+257. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd., 1909.) Price 6s. 6d. net.
- (2) *An Elementary Course in Practical Science.* Part iii. By C. Foxcroft and S. J. Bunting. Pp. 64. (London: G. Philip and Son, Ltd., n.d.) Price 6d. net.
- (1) THE book by Dr. Getman is intended for those students who, owing to little knowledge of physics, find it difficult to understand lectures on general chemistry. It deals in a brief manner with all the usual sections of physics, with the exception of sound. It is in many respects an admirable book. The chief laws and principles are in most cases very clearly expressed. As an example of this, attention may be directed to the concise and unambiguous treatment of the distinction between "mass" and "weight." The diagrams are good, and logical order is preserved. There is no doubt that a student thoroughly conversant with the contents would have little difficulty with his chemistry from a physical point of view. On the other hand, we think that for several reasons the book itself presents difficulties. The definitions, particularly in the first chapter or two, are sometimes rather loose. Matter is apologetically defined as "that which occupies space," a statement which is worthless. Surely a better provisional definition is "matter is that which has weight," and then the extension of "weight" to "gravitational attraction" could follow at a later stage. Again, a solid is defined as "a body which at ordinary temperatures does not change its shape under slight changes of pressure." This is untrue. There is no distinction, except in degree, between solids and fluids in this respect. The terms "stress" and "strain" are insufficiently defined, being merely given as alternatives for force and distortion respectively.

We feel, too, that the cutting out of detail, which the author admits in the preface, has been carried too far. The descriptions of experiments are thus in many cases vague, and in a few instances actually misleading. For example, in the determination of the